



Quantitative Research Methods

General studies / ISSS

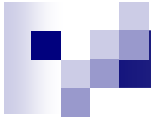
Tero Mamia



Introduction to Research Methods:

Quantitative Research Methods & SPSS Basic Course

- The course is part of the compulsory general studies
- Book exam:
 - Gilbert (ed.), Researching Social Life. Sage 1992 and
 - Rose, D. & Sullivan, O., Introducing Data Analysis for Social Scientists.
 - Friday 24.2.2006 12-16
 - Friday 28.4.2006 12-16
 - Room D10b, Main Building
 - Registration required (Dept of sociology and social psychology)
- Or: Gilbert + Rose&Sullivan chapters 1-3, 5 (9, 12) + lectures (4 x 2 h):
 - Friday 17.2.2006, 14-16 (B275)
 - Fridays 24.2.-10.3.2006, 12-14 (B275)
 - Examination: WHEN??



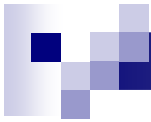
Objectives

- To understand:

- ☐ the logic and basic principles of quantitative research
- ☐ the idea of inferential statistics: generalization from sample to population

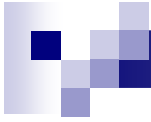
- To learn:

- ☐ How to obtain quantitative data?
- ☐ How to describe data and single variables?
- ☐ How to analyse relationships (dependencies) between two or more variables?



Lectures topics

- The quantitative method
- Research design and research process
- Sampling
- Types of variables and descriptive analysis
- Inferential statistics: from sample to population
- Associations between two variables: bivariate analysis
- Analysing three or more variables: elaboration and multivariate analysis



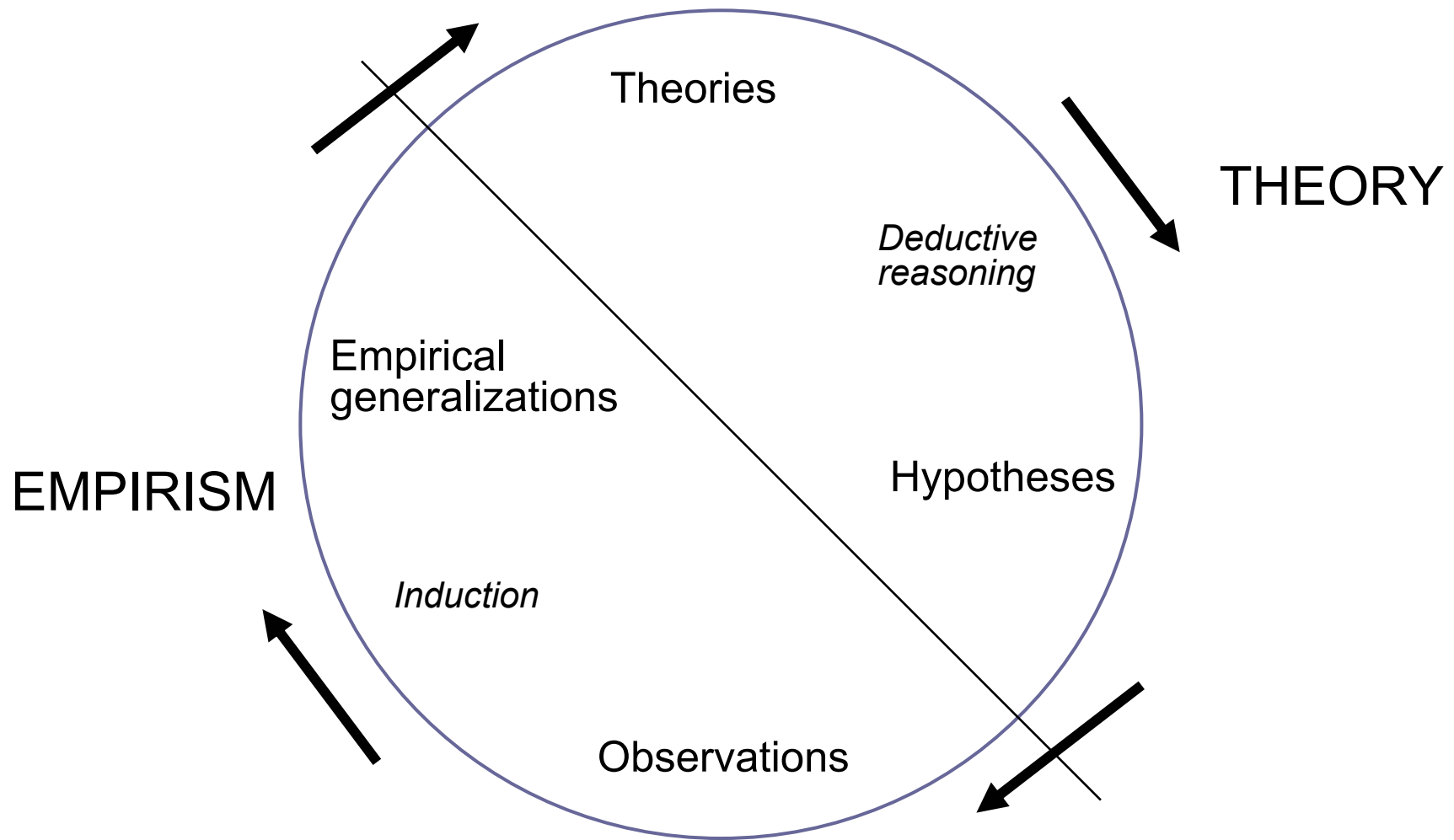
The logic of social research

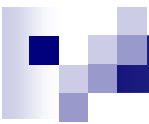
“...as social researchers we believe that *patterns and regularities* occur in society and that these are not simply random. The task we are faced with is to ask why these patterns exist: in other words to produce *explanations* of them.

We couch these explanations in terms of *theories*. Theories allow us to select out from a mass of confusing material those elements of reality which are of concern to us. On the basis of theory we can develop *hypotheses* about relationships which ought to exist, if the theory is valid.”

(Rose & Sullivan 1996, 10)

Classic hypothetic-deductive research





Notes on studying societies and human beings

- the object of study is not "deaf" → reflects and responds to new knowledge
- the object of study is not static but in constant flux → temporality of knowledge
- human beings are rational and self-conscious agents → causality problematic (probabilistic rather than deterministic)
- researcher is part of the object of study (society) → objectivity problematic
- measurement problematic?



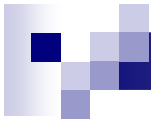
Description and explanation

- Social scientist ask basically two types of questions:
 1. What exists / happens in society?
 - ↳ *Descriptive* research
 2. Why does it exist / happen?
 - ↳ *Explanatory* research
- Most research includes both description and explanation.
- Good explanatory research can only be built on solid descriptive knowledge.
- It does not make sense to ask: "Why is social inequality increasing?" unless we have a good conception about "social inequality" and descriptive research that can demonstrate convincingly that it does increase
- Social research can also aim at *comparison* or *classification*



Theoretical and empirical research

- *Empirical research* has as the object of study some aspect (problem) of reality
 - Research data is obtained by some systematic method of empirical observation
- *Theoretical research* studies problems related to concepts, perspectives or theories of a given field (discipline)
 - Research data consists of previous research (analysis and synthesis)
- Sometimes empirical and theoretical research are pitted against each other: more fruitful to see them as complementing each other
- Scientific research as a *dialogue* between theory and empirism
- Most research involves both theoretical and empirical element



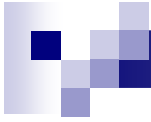
Quantitative and qualitative research

- Qualitative research aims at *understanding*. It answers primarily to *how?* -questions.
- Quantitative research aims at (causal) *explanation*. It answers primarily to *why?* -questions.
- Both qualitative and quantitative research can aim at *description* of social reality.
- Complementary - not contradictory
 - different kinds of research questions and objects of research
 - different perspectives on the same research objects / questions (methodological triangulation)
 - different stages in the research process
 - quantitative → qualitative
 - qualitative → quantitative



The quantitative method

- Based on the idea that social phenomena can be *quantified, measured* and *expressed numerically*.
- The information about a social phenomenon is expressed in numeric terms that can be analysed by statistical methods.
- The observations can be directly numeric information or can be classified into numeric *variables*.
- Observations are transformed into a *data matrix* in which each observation unit (e.g. individual) occupies one row and each variable one column.
- The data matrix is the starting point for the analysis.



Observation units and variables

- variable = observable and measurable characteristic of an observation unit, which varies across different units
- observation unit (i.e. research unit, case)
 - individual
 - group (e.g. family, household, couple)
 - institution, organization or community (e.g. school, enterprise, municipality)
 - text (e.g. newspaper article, a novel, research)
 - event or activity (war, strike, revolution)



Quantitative Research:

Strengths...

- Enables the research and description of social structures and processes that are not directly observable.
- Well-suited for quantitative description, comparisons between groups, areas etc.
- Description of change.
- Analysis and explanation of (causal) dependencies between social phenomena.

...and Weaknesses.

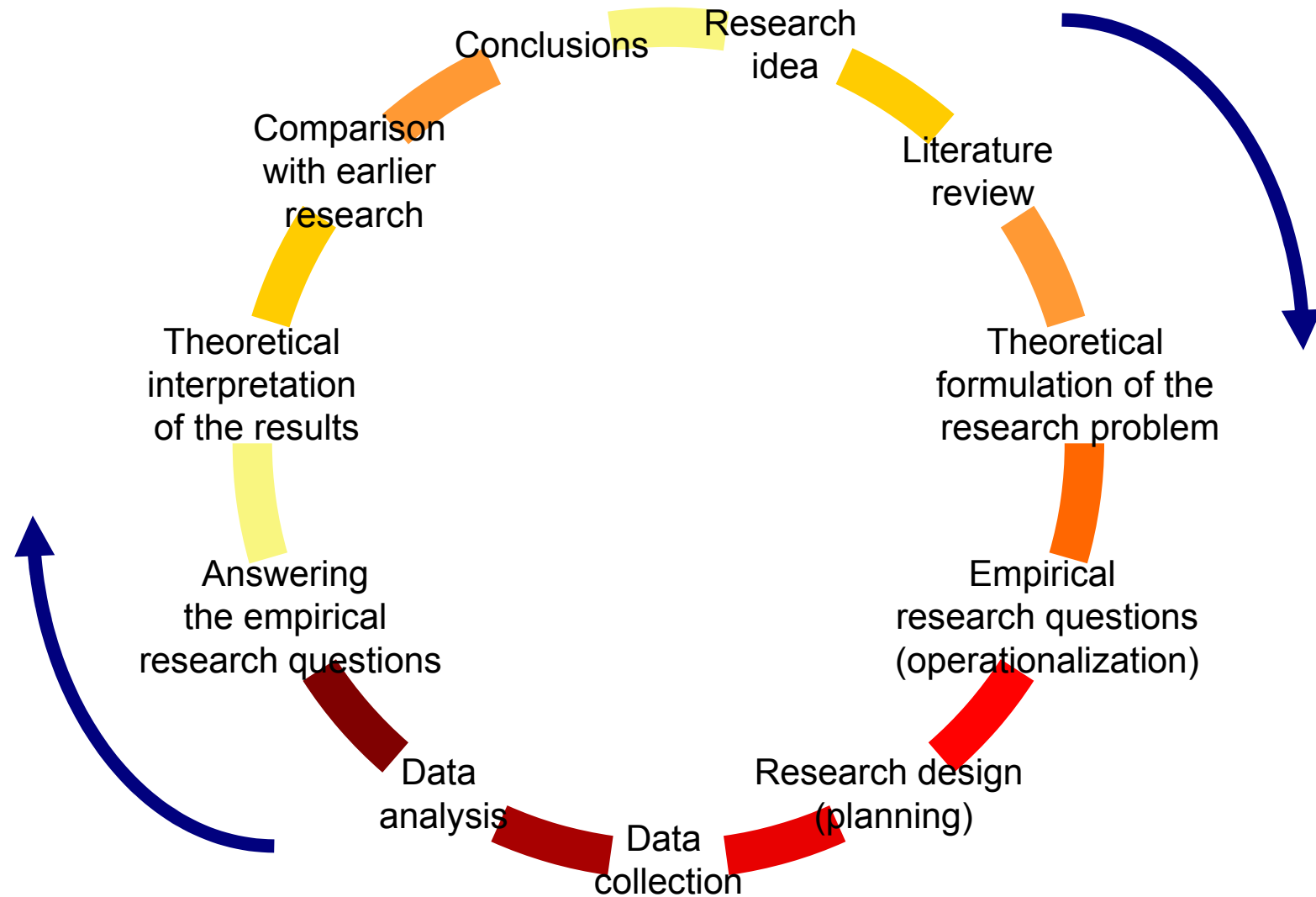
- Simplifies and "compresses" the complex reality: abstract and constrained perspective.
- Only applicable for measurable (quantifiable) phenomena
- Presumes relatively extensive knowledge on the subject matter in order to be able to ask "correct" questions.
- Difficult to study processes or "dynamic" phenomena: produces static view of the reality
- Description of actors' perspectives, intentions and meanings difficult.



Research as dialogue between theory and empirical observations

- Some kind of implicit theories about the nature of reality always directs our observation and interpretation of reality!
- Since we cannot "get away" from theory in scientific research it should be made explicit! (*transparency of research*)
- Theory provides us with a *framework* for the research
 - Outlining and conceptualization of research problems
 - Guides observation & helps in interpretation
 - Locates the research in scientific discussion
- Empirical data analysis as such is not scientific research.
- Data analysis should always be based on and discuss with theory and earlier research (theoretical framework).
- Theoretical formulation of research results enables generalization and enhances the "explanatory power" of the results.

The research process





Planning research

1. Selection of the theme / topic

- personal interest
- social significance
- theoretical interest
- “researchability”
- ethical questions: who’s interests does the research serve?

2. Getting acquainted with previous research on the same theme

- What do we know about the theme of research? What we don’t know?
- How has the theme been theoretically tackled (conceptualized)?
- Is there pre-existing data available?



3. Selection of the theoretical approach

4. Specification of the research problem

- into questions that can be answered by research
- conceptualization

5. Planning the empirical research process

- research design
- most suitable methods for the research problems and the design
- how to obtain data? (sampling)
- operationalization: measures and indicators

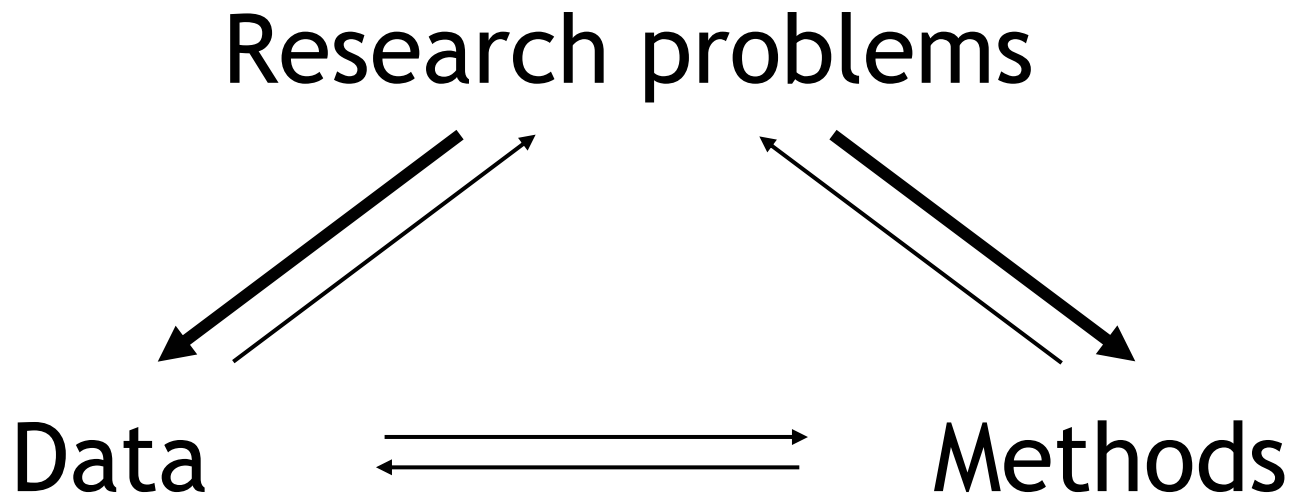


”Research design”

- Logical structure of the research (data).
- *“The function of a research design is to ensure that the evidence obtained enables us to answer the initial question as unambiguously as possible.”*

(David de Vaus: Research Design in Social Research, 2001)

- Empirical support for practically any hypothesis can usually be obtained by manipulating data.
- Good research design prevents this kind of manipulative use of data by taking into account possible alternative explanations and enabling comparisons and judgements between them.



- Research questions "dominate" the design.
- Data and methods are to be selected so that the research questions can be answered.
- Adopt a "sceptical mindset"!

The greatest challenge to any thinker is stating the problem in a way that will allow a solution. (Bertrand Russell)



Research designs

1. Experimental design
 2. Longitudinal design
 3. Cross-sectional design
 4. Case study design
- Design \neq method of data collection
 - Design \neq quantitative / qualitative

Research design and methods of data collection

| Research design | Experimental design | Longitudinal design | Cross-sectional design | Case study design |
|---------------------------|---|---|---|---|
| Method of data collection | <ul style="list-style-type: none">• Questionnaire | <ul style="list-style-type: none">• Questionnaire | <ul style="list-style-type: none">• Questionnaire | <ul style="list-style-type: none">• Questionnaire |
| | <ul style="list-style-type: none">• Structured interview | <ul style="list-style-type: none">• Structured interview | <ul style="list-style-type: none">• Structured interview | <ul style="list-style-type: none">• Structured interview |
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Elements of research design

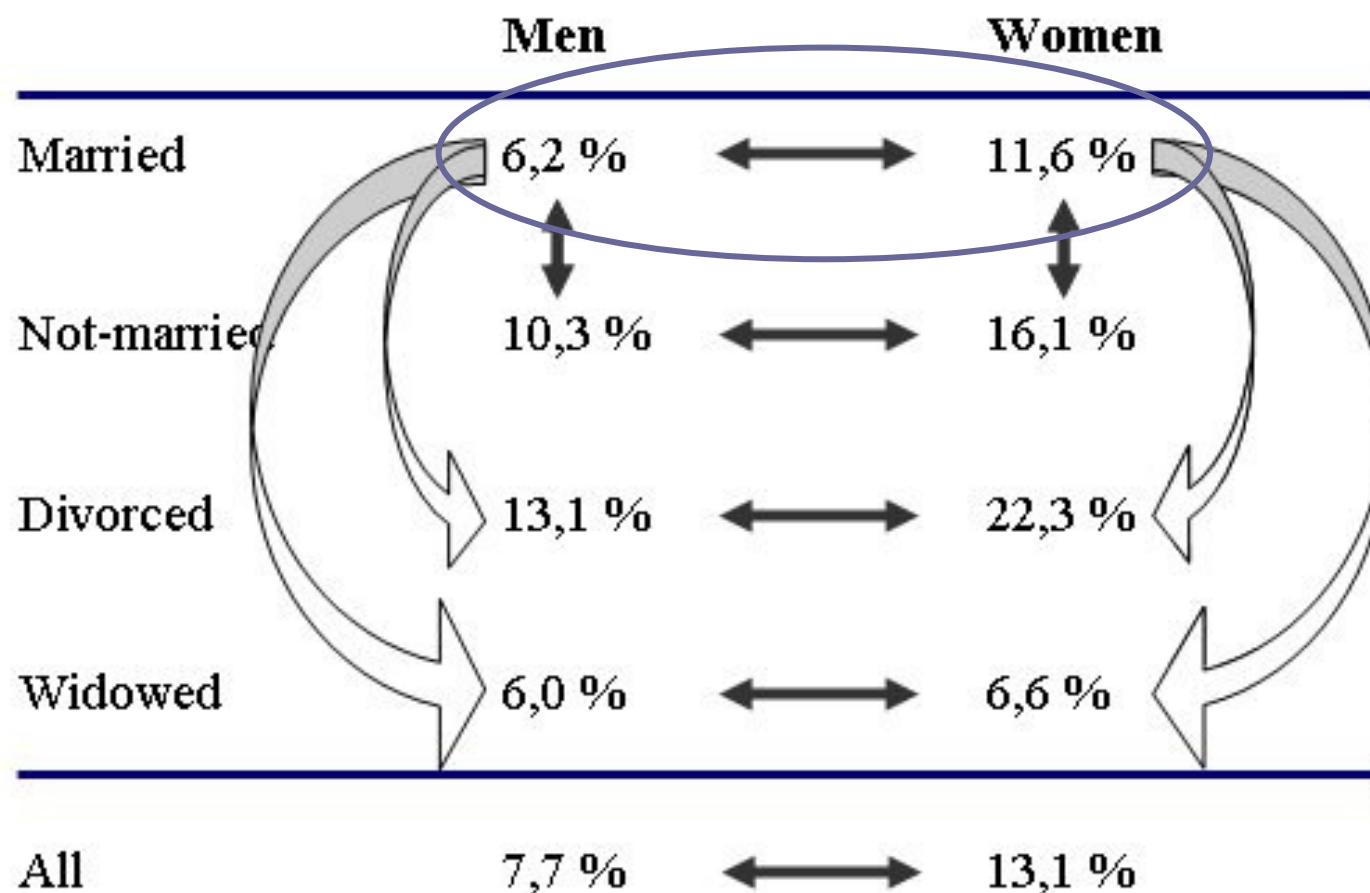
- Description, comparison, classification, explanation?
 - Time dimension: longitudinal or cross sectional?
Number of measurements? Prospective or retrospective?
 - Interventions?
 - Target population and research units?
 - Need for generalizations?
 - Method of data collection
 - Comparisons: good research design enables explanations that contradict theory/hypotheses
- ➔ Logical structure of research and data



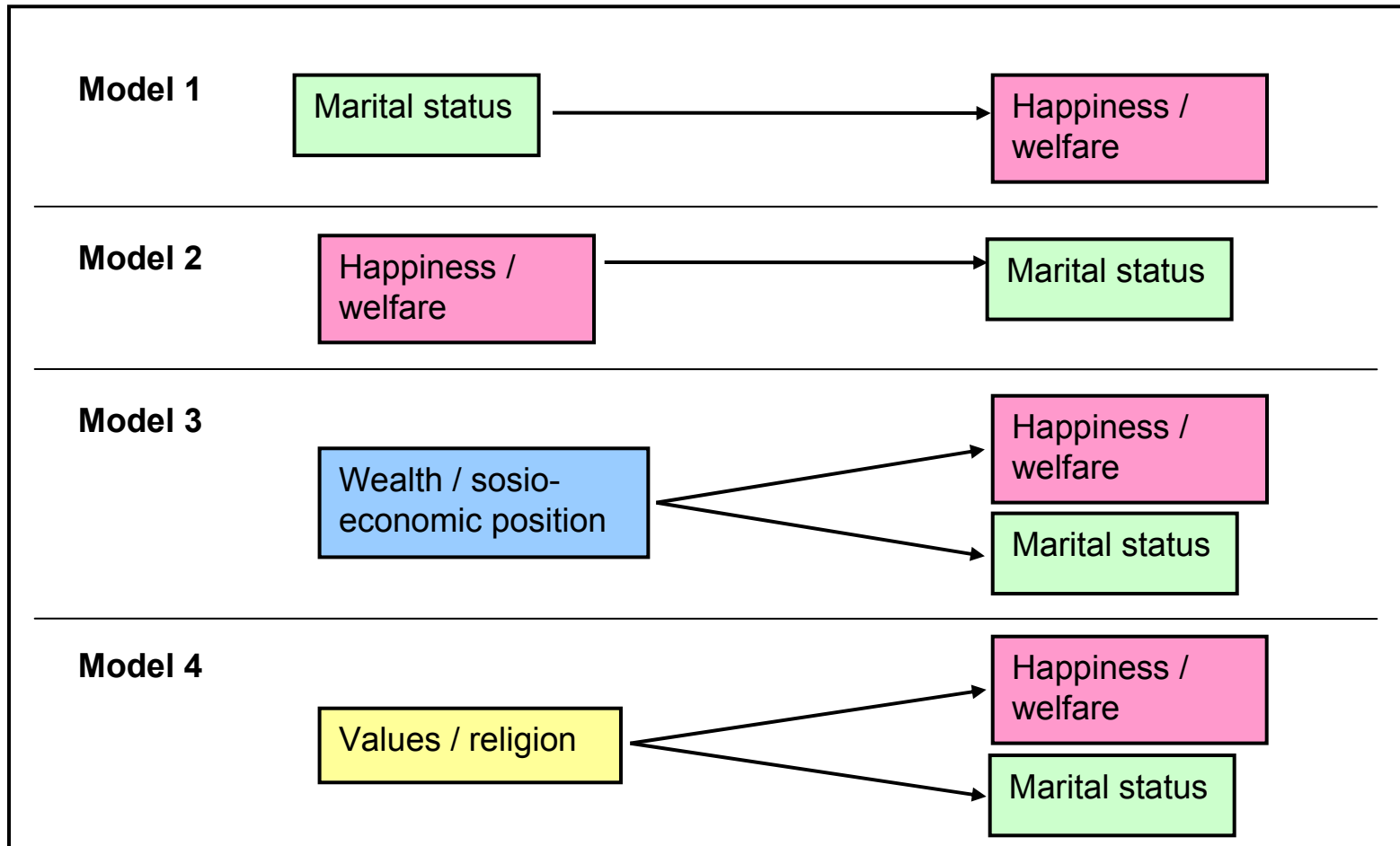
Examples on the effect of design

- Research on the effects of marriage on mental health of men and women (Jessie Bernard)
- Design: comparison of married men and women
- Results: “anxiety disorder”
 - Women 11,6 %
 - Men 6,2 %
- Conclusion: men do well out in marriage in comparison to women - especially in terms of mental health
- Are the results convincing? Do we have enough comparisons?

“anxiety disorder” (Bernard)



“Sceptical mind set” - example



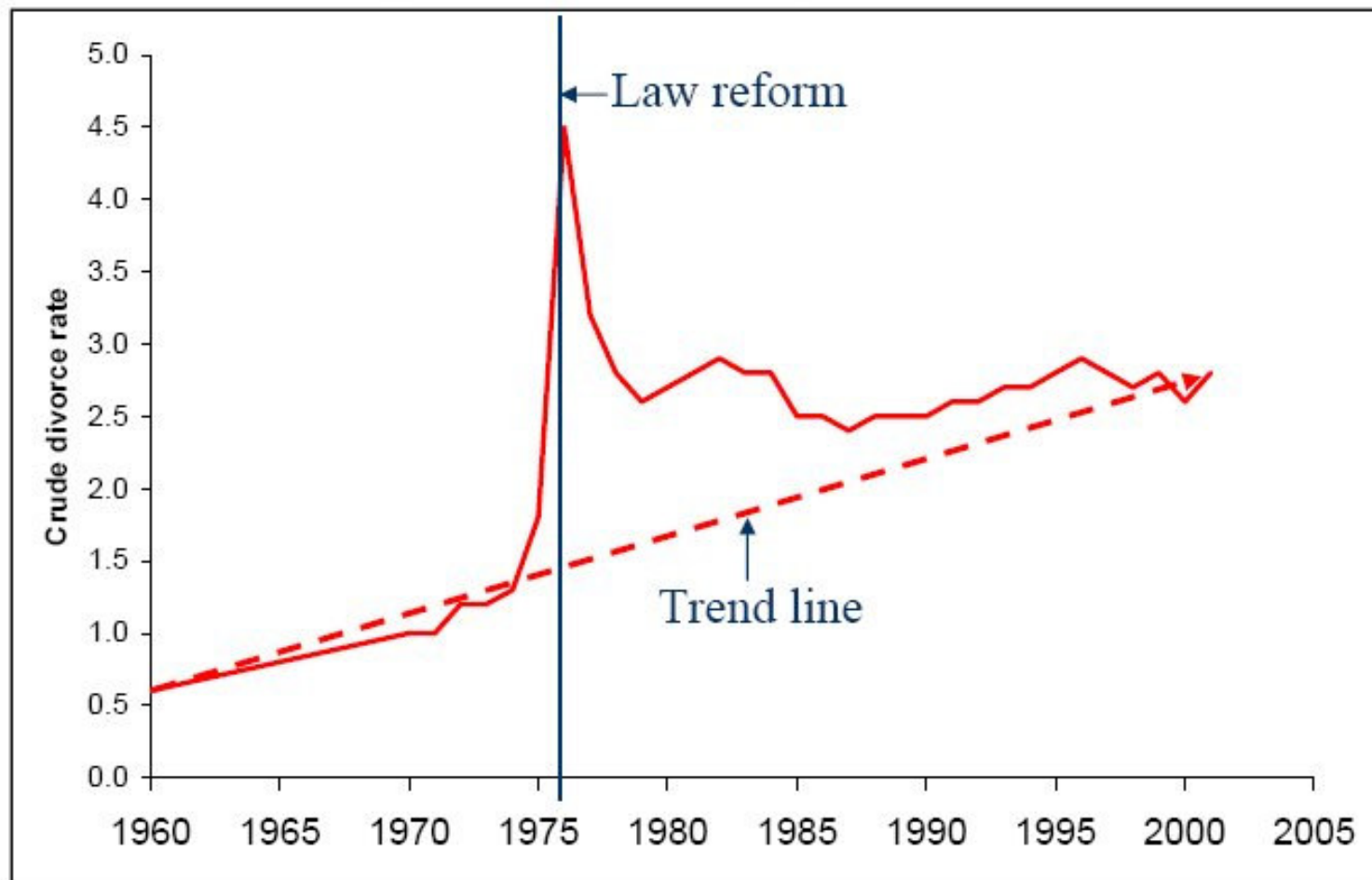


Example: Effects of divorce law reform

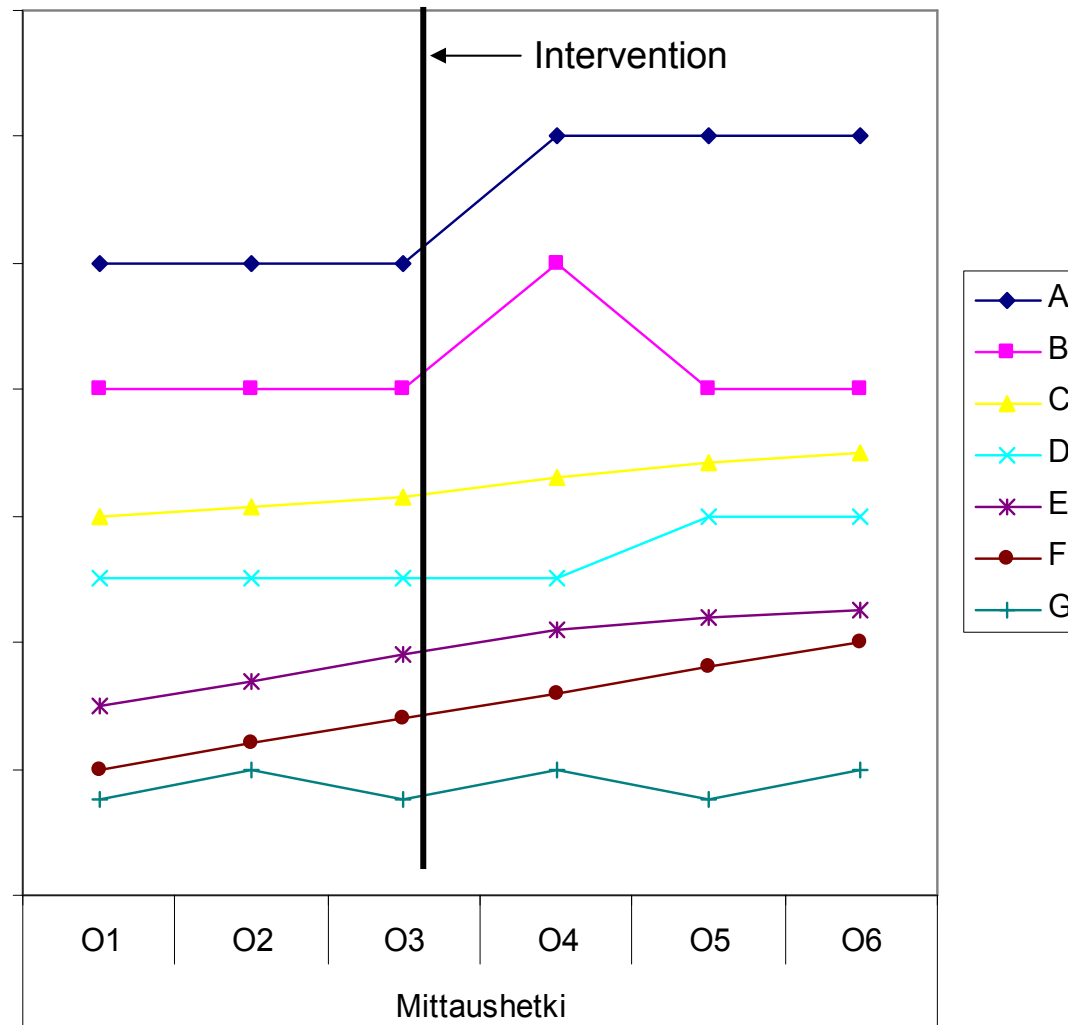
- In Australia “no fault” divorce law reform in Dec 1975
- Crude divorce rate:
1975: 1,8
1976: 4,5
- Public outcry: erosion of social order because of the law refrom!
- Is the interpretaion correct? Are the alternative explanations? Is the research design optimal and comparison adequate?

Divorce law reform

Crude divorce rate. Australia, 1960-2001



Number of measurements in longitudinal design

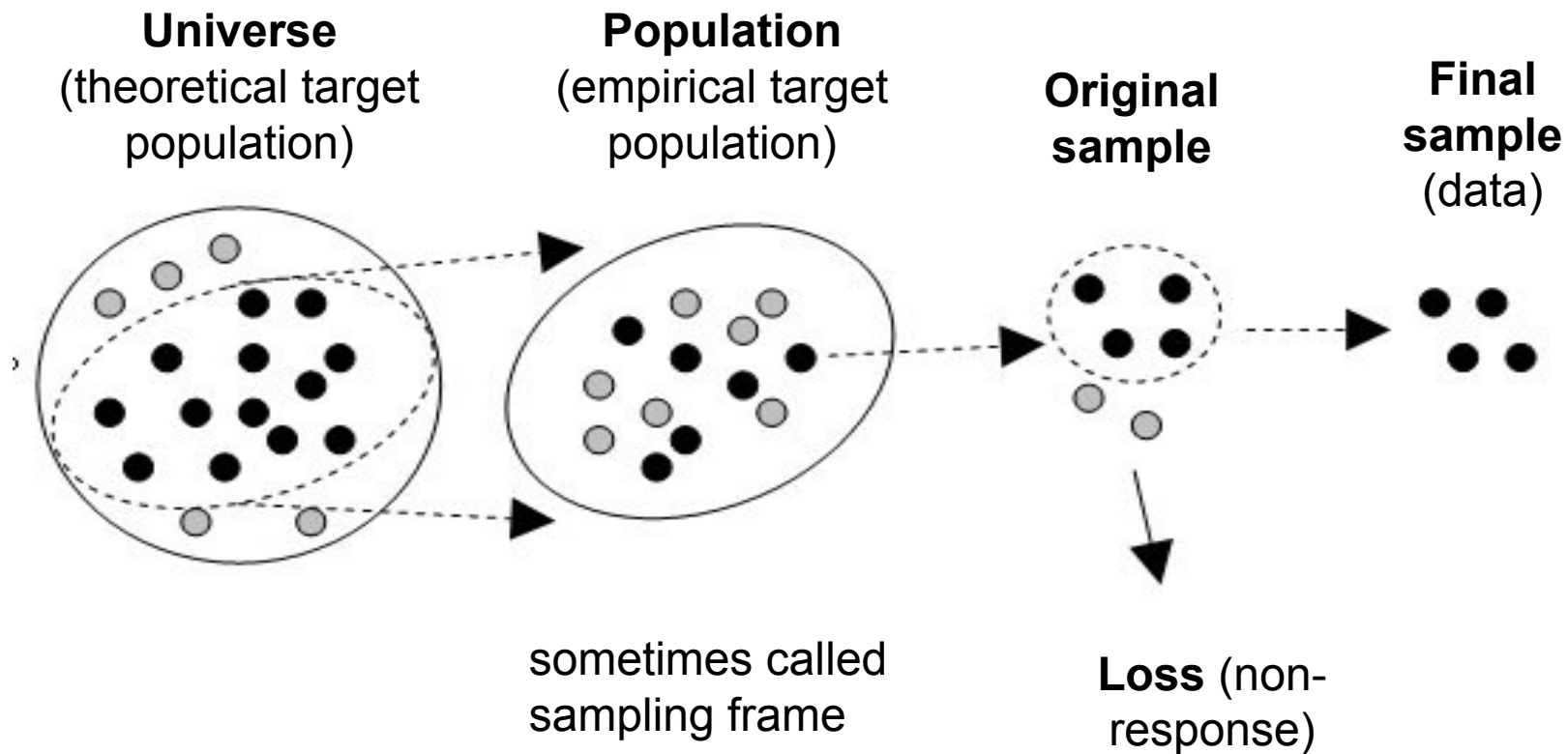




Sampling – selection of observation units

- When we are studying a very large group of cases (e.g. Finnish adult population), it is usually not possible to obtain observations of all the cases.
- Therefore, we study a *sample* of the group (population) which represents the larger whole.
- There is always a risk that the units selected in the sample are somehow exceptional, i.e. the sample does not represent the population (sampling error).
- We minimize this risk by *random sampling*.
- In a random sample the risk of sampling error can be statistically estimated.
- With random (and representative) sample we can with a definite *level of confidence* make generalizations from sample to the population.

Sampling: central concepts



The aim of sampling is to produce a miniature copy of the population. Each member of the population has an equal likelihood of being selected into the sample. Hence we can make inferences about the larger population based on the sample.



Sampling methods

- Probability sampling vs. purposive (non-probability) sampling methods
 1. Simple random sampling
 2. Systematic selection (interval sampling)
 3. Stratified sampling (proportional and disproportional)
 4. Clustered sampling
 5. Quota sampling (non-probability method)



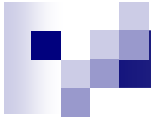
Representativeness

1. Equivalence of universe and population (sampling frame)
2. Equivalence of population and sample
 - ☐ when sampling is done correctly these should be equivalent within a certain error margin
 - ☐ the bigger the sample, the lesser the likelihood of *sampling error* → How big is big enough?
3. Equivalence of original and final sample
 - representativeness of the (final) sample
 - ☐ *response rate*? 50% - satisfactory, 60% - good, 70%-100% - excellent
 - ☐ has non-response created *bias* in the sample (comparison with the known population data)



Methods for obtaining data

- Survey research (all require a structured questionnaire, where each observation unit is posed with the exact same questions)
 - ☐ postal questionnaire survey
 - ☐ e-mail questionnaire survey
 - ☐ (Internet polls)
 - ☐ face-to-face interviews
 - ☐ telephone interviews
- Systematic observation
- Text analysis
- Statistical data (secondary analysis)
- Register data



Ethical principles in obtaining data

- no harm may be done to the participants
- “informed consent”
- anonymity
- confidence